more that is indispensable to teaching the minor arts as a system even to the youngest children. Nor does Mr. Barter mention the so-called Venetian *intarsiatura*, in which the pattern, drawn on one piece of wood, is cut half through the panel, the line being then filled with coloured mastic, and the pattern dyed. But such sins of omission are trifling, though in a book which proclaims on its title that it is devoted to wood-work we should have expected something more than carpentry, and at least a full description of Slöjd carving. And having pointed out, as in conscience bound, every defect, we feel it to be a duty to congratulate the publishers of this remarkably handsome, well-bound, and useful work on having done their best, and on having issued a manual which deserves a place in every industrial school.

But there is a word to be said as regards the preface and a portion of the introduction. It is perfectly true that manual instruction for children develops their intellects, and fits them for life far more than ordinary school studies usually do. But it is not true that this training should consist, as Messrs. Ricks and Barter virtually declare, of nothing but Slöjd, be it Swedish or English, or of carpenters' work. Such training should be for girls as well as boys, and it should be based on design and drawing, taught simultaneously in the simplest and easiest freehand; after which the pupils may take up not merely carpentry, or even Slöjd—which is nothing effectively but a minor branch of wood-carving—but also wood-carving itself, and many other arts, all of which come as one and promptly to the pupil who can design, and, when occasion favours, also can model a little. But to expect that carpentry alone, without a trace of art, is all that is needed to inspire the creative faculty is a great mistake; and what is worse is that, despite thousands of living examples of the superiority of the more artistic method for children, the British—like the American—public persists in believing that all that is needed is to teach "our boys" how to make benches and boxes.

OUR BOOK SHELF.

Thermodynamische Studien. Von J. Willard Gibbs, übersetzt von W. Ostwald. (Leipzig: Engelmann, 1892.)

THIS is a German translation of three of Prof. Gibbs's Thermodynamic Papers. These were published during the years 1873-8, in the Transactions of the Connecticut Academy (vols. ii. and iii.); and one reason which prompted Prof. Ostwald to undertake the translation of them was their inaccessibility to the general scientific public. Their importance is sufficiently attested by the fact that part of the ground covered by Prof. Gibbs has been gone over again by later writers who deemed they were themselves pioneers.

"Graphical Methods in the Thermodynamics of Fluids" is the title of the first paper. It gives for the first time a general account of the comparative advantages of using various pairs of the five fundamental thermodynamic quantities for graphical representation. The entropy-temperature and entropy-volume diagrams are discussed in considerable detail. The second paper contains the description of the volume-energy-entropy surface, which generally goes by the name of Gibbs's thermodynamic surface. Its contents are familiar to all who have studied Maxwell's "Theory of Heat."

The third paper, "On the Equilibrium of Heterogeneous Substances," fills five-sixths (344 pages) of the whole book, and is, out of question, by far the weightiest contribution which Prof. Gibbs has made to the development of thermodynamic methods. To him must be given the credit of first formulating the energy-entropy criterion of equilibrium and stability, and developing it in a form applicable to the complicated problems of dissociation. To give anything like a complete idea of the contents of this paper, with its discussion of critical points, capillarity, growth of crystals, electromotive force, &c., would mean the reproduction of Prof. Gibbs's own very full synopsis, which in the German translation forms the greater part of the table of contents of the book. It will suffice to notice the general theory of the voltaic cell, with which the paper ends. Here distinctly for the first time is it pointed out that the electromotive force of the cell depends on other factors than the variations of its energy. Von Helmholtz's theory, which differs from that given by Prof. Gibbs only in the greater fulness of detail, was not published till 1882.

Prof. Ostwald tells us that he had the benefit of the author's revision. With the exception of a few obvious corrections the original papers are most faithfully reproduced, even to certain footnotes which in these days have no particular value. In the circumstances a little license might well have been taken, and a slavish adherence to the original text departed from. For example, it is surely most desirable to use the word *isenergic* for lines of equal energy, and not the inappropriate term *isodynamic* which Prof. Gibbs made use of in his paper of 1873. Again, we question the right of any writer on thermodynamics to use the word *reversible* in other than Carnot's sense. Such double meanings tend to produce confusion, in spite of elaborate footnotes.

These blemishes apart, however, there is no doubt that Prof. Ostwald deserves great credit for his labour of love in preparing this translation. He has made it possible for the many, who know of Prof. Gibbs's work only at second hand, to acquaint themselves with the original papers, and we feel confident that the book will find its place on the shelves of all who desire a really complete library of thermodynamic literature.

Elements of Physic. By C. E. Fessenden. (London: Macmillan and Co., 1892.)

THE subject matter of this book is arranged in four chapters—Matter and its Properties, Kinematics, Dynamics (including statics, hydrostatics, and pneumatics), and Heat. It thus forms an excellent introduction to a more extended study of physical science. The treatment of the subject is based largely on simple experiments to be performed by the student himself, whose reasoning powers the author seeks to draw out as far as possible by suggestive questions interspersed through the text. The following example will give a good idea of the style of treatment:—

". . . All experience teaches that *no two portions of matter can occupy the same space at the same time.* This property which matter possesses of excluding other matter from its own space, is called *impenetrability*. It is peculiar to matter, nothing else possesses it. These facts being known, let us proceed to put certain interrogations to nature. Is air matter? Is a vessel full of air a vessel full of nothing? Is it 'empty'? *Can matter exist in an invisible state?*

"*Experiment* 1.—Float a cork on a surface of water, cover it with a tumbler, or tall glass jar, and thrust the glass vessel, mouth downward, into the water. . . . State *how* the experiment answers each of the above questions and what evidence it furnishes that air is matter, or, at least, that air is like matter.

"*Experiment* 2.—Hold a test tube for a minute over the

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mouth of a bottle containing ammonia water. Hold another tube over a bottle containing hydrochloric acid. The tubes become filled with gases that rise from the bottles, yet nothing can be seen in either tube. Place the mouth of the first tube over the mouth of the second, and invert. Do you see any evidence of the presence of matter? Was this matter in the tubes before they were brought together? If not, from what was it formed? Which of the proposed questions does this experiment answer? How does the experiment answer it?"

In many cases the questions asked are beyond the powers of the average beginner to answer, but this is not a serious objection if the book is used, as seems to be intended, for class instruction in schools. For such use it is admirably well adapted. Numerous questions and examples are scattered throughout the text; in the sections of kinematics and dynamics geometrical treatment alone is adopted, the student being supposed to be acquainted with Euclid but not with trigonometry.

The style is concise, but clear and accurate, and as the book has not been written with the view of preparing the student for any special examination it is refreshingly free from any tendency towards cram. H. H. H.

Recette, Conservation, et Travail des Bois. Par M. Alheilig. (Paris: Gauthier-Villars et Fils, 1892.)

THIS little book belongs to the useful series entitled "Encyclopédie Scientifique des Aide-Mémoire." The author presents a remarkably clear summary of the principal facts relating to wood, regarded from an industrial point of view. Although iron and steel have to so large an extent taken the place of wood in various great constructions, wood is still, of course, needed in vast quantities, and instruction in the proper way of dealing with it for industrial purposes must always form an important department of technical education. M. Alheilig has supplied a good text-book, the most valuable characteristic of which is that its practical details rest on a sound basis of scientific principle. He is especially successful in the chapters on the tools and machinery used in the working of wood.

Country Thoughts for Town Readers. By K. B. Baghot de la Bere. (London: Simpkin, Marshall, and Co., 1892.)

THE greater part of this book consists of imaginary conversations between a Canon and "a city lawyer," who spends two days with him in the country. The Canon lectures his friend with an air of authority and patronage which would not be particularly agreeable to ordinary mortals. The city lawyer, however, is never tired of thanking the great man for the knowledge he communicates. The Canon's information is made up chiefly of scraps of scientific commonplace, which, if they can be of no particular service to any class of readers, are at least harmless.

A Synoptical Geography of the World. (London: Blackie and Son.)

NO effort has been made by the compiler of this handbook to present geography in an attractive form. The volume consists of a number of bald statements which, as here given, could neither excite interest nor form any real addition to knowledge. It is not intended, however, that the book shall be used apart from other means of instruction. It is meant to be taken "in conjunction with a fuller text-book or the teacher's lectures." Used in this way it may be of some service to students in the revision of their work before examination. A good many maps have been specially engraved to accompany the text.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

An Acoustic Method whereby the Depth of Water in a River may be measured at a Distance.

ABOUT two years ago, I wished to know from time to time the rate at which a river was rising after a fall of rain. The river was at a considerable distance from the spot where its height was to be known. By means of the combination of two organ pipes, and a telephonic circuit, described in the following lines, I have been able to make the required measurement within rather close limits. At the river station, an organ pipe was fixed vertically in an inverted position, so that the water in the river acted as a stopper to the pipe, and the rise or fall of the water determined the note it gave, when blown by a small bellows driven by a very small water-wheel. A microphone was attached to the upper end of the organ pipe; this was in circuit with a wire leading to a town station at some distance; at the town station there was an exactly similar organ pipe, which could be lowered into a vessel full of water while it was sounding. By means of the telephone the note given by the pipe at the river was clearly heard at the town station; then the organ pipe at this station was lowered or raised by hand until it gave the same note. The lengths of the organ pipes under water at the two stations were then equal, so that the height of the water in the distant river was known.

The determination can be made in less than a minute by any one who can recognize the agreement of two similar notes. The arrangement when first tested was so placed that the height of water at two places near together might be easily compared. I found that a lad with an average ear for musical sounds was able to get the two heights to agree within one-eighth of an inch of each other, while a person with an educated ear adjusted the instrument immediately to almost exact agreement. The total height to be measured was 17 inches. A difference of temperature at the two stations would make a small difference in the observed heights. For example, taking a note caused by 250 vibrations per second, a difference of 10° C. between the temperatures of the two stations (one not likely to occur) would make a difference of about 0·02 feet in the height, a quantity of no moment in such a class of measurements. The organ pipes were of square section, and made of metal to resist the action of the water.

FREDERICK J. SMITH.

Trinity College, Oxford, June 28.

Waterspouts in East Yorkshire.

ON June 9, 1888, a waterspout was seen traversing the Yorkshire wolds in the neighbourhood of Langtoft, which finally spent its fury on the north-eastern side of a large basin-like range of valleys, where a steep declivity barred its further progress. A single cutting or trench was made in a slight hollow of the hill, and in this three large holes were scooped out of the chalk, which was here composed of much rubble, about seven feet in diameter and depth.

On July 3 of the present year, another waterspout has been developed, and has again expended its energy on the same hill as the previous one in 1888, a few yards only further south of the former site, and, taking a trifle more easterly course, has cut three parallel ditches or elongated pits in the solid chalk, two of them twenty to thirty yards in length, and seven to ten feet deep in the deepest portions, scattering the whole of the expelled rock, amounting to many tons, to the foot of the hill.

Serious floods were consequent, and the village of Langtoft, which is situated lower down the valley, was terribly inundated with a volume of water seven to ten feet in height, an immense amount of damage being done, including the total demolition of two cottages and a workshop. Fortunately no lives were lost beyond several pigs, sheep, and a few hundred fowls.

Driffield, July 9. J. LOVEL.

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